Immune Protection of Stem Cell-Derived Islet Cell Therapy for Treating Diabetes.

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Public Summary:
Insulin injection is currently the main therapy for type 1 diabetes (T1D) or late stage of severe type 2 diabetes (T2D). Human pancreatic islet transplantation confers a significant improvement in glycemic control and prevents life-threatening severe hypoglycemia in T1D patients. However, the shortage of cadaveric human islets limits their therapeutic potential. In addition, chronic immunosuppression, which is required to avoid rejection of transplanted islets, is associated with severe complications, such as an increased risk of malignancies and infections. Thus, there is a significant need for novel approaches to the large-scale generation of functional human islets protected from autoimmune rejection in order to ensure durable graft acceptance without immunosuppression. An important step in addressing this need is to strengthen our understanding of transplant immune tolerance mechanisms for both graft rejection and autoimmune rejection. Engineering of functional human pancreatic islets that can avoid attacks from host immune cells would provide an alternative safe resource for transplantation therapy. Human pluripotent stem cells (hPSCs) offer a potentially limitless supply of cells because of their self-renewal ability and pluripotency. Therefore, studying immune tolerance induction in hPSC-derived human pancreatic islets will directly contribute toward the goal of generating a functional cure for insulin-dependent diabetes. In this review, we will discuss the current progress in the immune protection of stem cell-derived islet cell therapy for treating diabetes.

Scientific Abstract:
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